

CHAPTER 1

INTRODUCTION

1.1 Introduction

This thesis was written for the purpose in presenting an algorithm that can define a movement of a constant speed missile until it reach its desired target or location. This will involve some of the navigation, guidance and control processing topic which are the guide line in developing the algorithm. In electronic warfare (EW) system, the determination a location of a target location is one of the fundamental function.

1.2 Algorithm Definition

Algorithm is a finite set of well define instruction in accomplishing a task with the given initial state until it reach it end state. There are various way in classifying an algorithm. In terms of implementation, an algorithm can be define in mean of recursion/iteration, logical, serial/parallel, deterministic/non deterministic, and exact/approximate. Sometimes it can also be classified by design paradigm such as devide and conquer, dynamic programming, greedy method, linear programming, reduction, search and enumeration and probabilistic and heuristic paradigm [1].

1.3 Electronic Warfare Definition

EW is military action to exploit the electromagnetic spectrum which encompasses the interception, identification and location of electromagnetic emissions. The employment of electromagnetic energy to reduce or prevent hostile use of the electromagnetic spectrum and actions to ensure its effective use by friendly forces [2]. Electronic warfare has three main components: electronic support, electronic attack, and electronic protection.

1.3.1 Electronic Support (ES)

Electronic support (ES) is the passive use of the electromagnetic spectrum to gain intelligence about other parties on the battlefield in order to find, identify, locate and intercept potential threats or targets. This intelligence, known as ELINT, might be used directly by fire-control systems for artillery or air strike orders, for mobilization of friendly forces to a specific location or objective on the battlefield, or as the basis of electronic attack or electronic protection actions. Because ES is conducted passively, it can be performed without the enemy ever knowing it. Its counterpart, SIGINT, is continuously performed by most of the world's countries in order to gain intelligence derived from other parties' electronic equipment and tactics. An older term for ES is electronic support measures (ESM)[3].

1.3.2 Electronic attack (EA)

Electronic attack (EA) is the active or passive use of the electromagnetic spectrum to deny its use by an adversary. Active EA includes such activities as jamming, deception, active cancellation, and EMP use. Passive EA includes such activities as the use of chaff, towed decoys, balloons, radar reflectors, winged decoys, and stealth. EA operations can be detected by an adversary due to their active transmissions. Many modern EA techniques are considered to be highly classified. An older term for EA is electronic countermeasures (ECM)[3].

1.3.3 Electronic Protection (EP)

Active EP includes such activities as technical modifications to radio equipment (such as frequency-hopping spread spectrum). Passive EP includes such activities as the education of operators (enforcing strict discipline) and modified battlefield tactics or operations. Older terms for EP include electronic protective measures (EPM) and electronic counter countermeasures (ECCM)[3].

1.4 Objective

The main objective of this project is to realize the movement of a missile towards the desired destination in a simulation form. In order to accomplish the project, the following sub-objectives are necessary to be achieved before hand.

- 1.4.1 To implement and possibly improve the existing mathematical model of path planning for constant speed missile.
- 1.4.2 To develop simulations for the movement of a constant speed object representing a constant speed missile
- 1.4.3 To implement existing guidance algorithm that allowing the constant speed missile reaching the desired destination from its initial position.

1.5 Scope of Work

The scope of work is to clearly define the specific field of the research and ensure that the entire content of this thesis is confined to the scope. It is begins with the implementation or possibly an improved implementation of existing mathematical model on a missile for the following specifications such as it has constant speed at all times with velocity of $v(t)$ and limited swerving ability of $\alpha(t)$.

The next step is to model a simulation to represent the missile as per the specifications. Then the missile is visualized in a simulation to move from its initial position to the desired destination. Finally, the validation of the approach effectiveness is carried out in between the targeted and simulation destination. The scope of work can be described in terms of flowchart as per the following **Figure 1.1**.

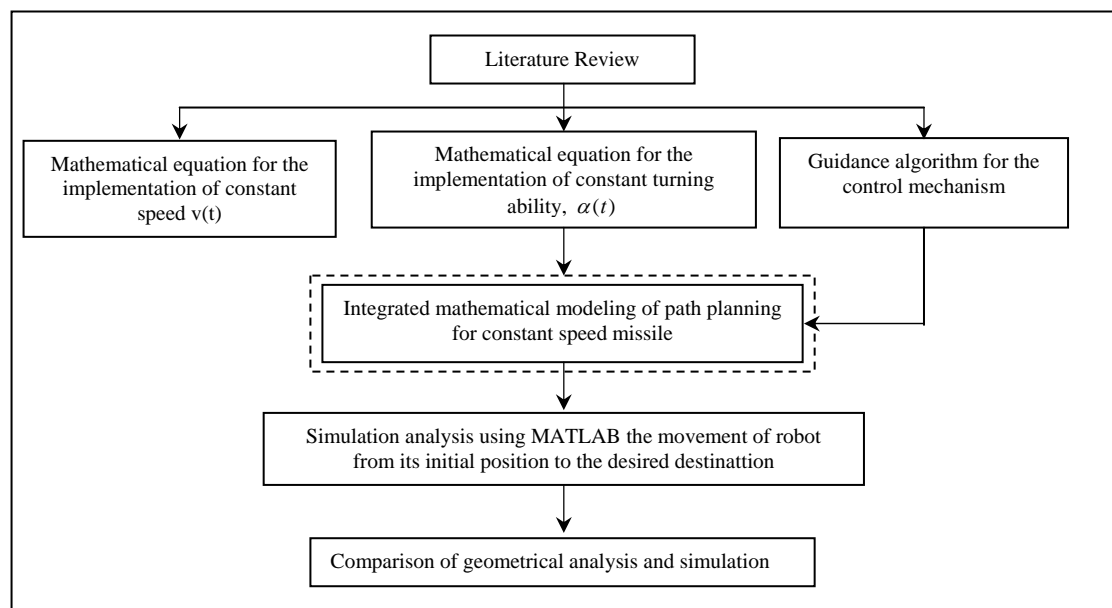


Figure 1.1 : Flowchart represent the scope of work

1.6 Outline Of The Thesis

Chapter 1 in this thesis basically an introduction of all the topics and discussion which involve in developing the algorithm. It seem to be the overview of all the subject in the thesis.

Chapter 2 is the literature review which introduces the overview of the existing algorithm and missile research. The explanation begins with the related existing work which is found to be related to this project. This chapter is then described the existing missile system implementation and current interest in the missile research.

Chapter 3 provides the method that is used of this project. It covers the technical explanation of this project and the implemented technique of mathematical equations and guidance algorithm for both plotting and simulation.

Chapter 4 deals with the results of the geometrical analysis and MATLAB's simulation. The multi-conditions of the execution for MATLAB's simulation will also be presented in this topic.

Chapter 5 presents the conclusions of the project as well as some constructive suggestions for further development and the contribution of this project. As for future development, some suggestions are highlighted with the basis of the limitation of the effectiveness mathematical equation and simulation analysis executed in this project. The aim of the suggestions is no other than the improvement of the study.